

[0229] FIG. 1 is an example functional block diagram of a Bluetooth LE wireless device 100 functioning as a NAN scanner, sending a Bluetooth LE SCAN_REQ PDU seeking to discover whether a specified service SID is available from an advertiser 110, in Bluetooth LE active scanning. The Bluetooth LE wireless device 100 assigns the specified SID to the ScanA field of the SCAN_REQ PDU. The non-resolvable private address format in the ScanA field of SCAN_REQ PDU, is set to the SID of the service requested. The Bluetooth LE wireless device 100 then transmits the SCAN_REQ PDU to the Bluetooth LE wireless device 110 functioning as the NAN advertiser. The Bluetooth LE wireless device 110 has previously buffered the SIDs of the services it has available. The Bluetooth LE wireless device 110 analyzes the ScanA field of the received SCAN_REQ PDU and determines whether there is any match with the buffered SIDs, for NAN service discovery, in accordance with at least one embodiment of the present invention.

[0230] In an example embodiment of the invention, the wireless device 100 and the wireless device 110 may be a communications device, PDA, cell phone, laptop or palmtop computer, or the like or it may be a stationary access point, automotive dashboard interface, home electronics interface or other stationary interface or device. The wireless device 110 and the wireless device 100 may be a remote controller, healthcare monitor, sports sensor, token, key fob, watch, wireless keyboard, gaming pad, body sensor, toy, health care equipment, human interface device, entertainment device, wireless microphone, GPS sensor, or the like.

[0231] In an example embodiment of the invention, the wireless device 110 and the wireless device 100 may include a processor 220 that includes a single core or multi-core central processing unit (CPU) 260 and 261, a random access memory (RAM) 262, a read only memory (ROM) 264, and interface circuits 266 to interface with the radio transceiver 208. The wireless device 110 and the wireless device 100 may each further include a battery and other power sources, key pad, touch screen, display, microphone, speakers, ear pieces, camera or other imaging devices, etc. The RAM 262 and ROM 264 may be removable memory devices such as smart cards, SIMs, WIMs, semiconductor memories such as RAM, ROM, PROMS, flash memory devices, etc. according to an embodiment of the present invention. According to an example embodiment of the invention, the wireless device 110 and the wireless device 100 each include the awareness protocol stack 202.

[0232] In an example embodiment of the invention, the awareness protocol stack 202 may include the NAN discovery engine 205 and the MAC with NAN support 210. In an example embodiment of the invention, the awareness protocol stack 202 may include an Awareness Layer, Community Layer, Network Layer, and Link Layer. In an example embodiment of the invention, the awareness protocol stack 202 may include the Bluetooth LE protocol stack 215.

[0233] In an example embodiment of the invention, the processor 220, protocol stack 202 and/or application program 200 may be embodied as program logic stored in the RAM 262 and/or ROM 264 in the form of sequences of programmed instructions which, when executed in the CPUs 260 and/or 261, carry out the functions of the disclosed embodiments. The program logic may be delivered to the writeable RAM, PROMS, flash memory devices, etc. 262 of the wireless device 110 and the wireless device 100 from a computer program product or article of manufacture in the form of

computer-usable media such as resident memory devices, smart cards or other removable memory devices, as illustrated in FIG. 5. Alternately, they may be embodied as integrated circuit logic in the form of programmed logic arrays or custom designed application specific integrated circuits (ASIC). The radio 208 in each of the wireless device 110 and the wireless device 100 may be separate transceiver circuits or alternately, the radio 208 may be a single radio module capable of handling one or multiple channels in a high speed, time and frequency multiplexed manner in response to the processor 220. The program code for instructing the apparatus to perform its various operations may be stored in computer readable media, for example magnetic disks, CD ROMS, or flash memory devices. The program code may be downloaded from such computer readable media to be stored for example in the RAM 262 or programmable ROM 264 of the wireless device 110 and the wireless device 100 for execution of the program code for example by the CPUs 260 and/or 261. Removable storage media 126 are shown in FIG. 5.

[0234] In an example embodiment of the invention, the Bluetooth LE wireless device 100 buffers the specified SID of the service to be discovered, in the buffer 150. The Bluetooth LE wireless device 100 assigns the specified SID to the ScanA field of the SCAN_REQ PDU in block 142. The non-resolvable private address format in the ScanA field of SCAN_REQ PDU, is set to the SID of the service requested. The Bluetooth LE wireless device 100 then transmits the SCAN_REQ PDU to the Bluetooth LE wireless device 110 functioning as the NAN advertiser.

[0235] In an example embodiment of the invention, the Bluetooth LE wireless device 110 has previously buffered the SIDs of the services it has available in buffer 151. The Bluetooth LE wireless device 110 analyzes the ScanA field of the received SCAN_REQ PDU and determines whether there is any match with the buffered SIDs, for NAN service discovery in block 153.

[0236] FIG. 2A illustrates the formats of Bluetooth LE advertising channel PDUs.

[0237] The ADV_IND PDU has the Payload as shown in FIG. 2A. The PDU shall be used in connectable undirected advertising events. The TxAdd in the Flags field indicates whether the advertiser's address in the AdvA field is public (TxAdd=0) or random (TxAdd=1). The Payload field consists of AdvA and AdvData fields. The AdvA field shall contain the advertiser's public or random device address as indicated by PDU Type TxAdd. The AdvData field may contain Advertising Data from the advertiser's Host.

[0238] The ADV_SCAN_IND PDU has the Payload as shown in FIG. 2A. The PDU shall be used in scannable undirected advertising events. The TxAdd in the Flags field indicates whether the advertiser's address in the AdvA field is public (TxAdd=0) or random (TxAdd=1). The Payload field consists of AdvA and AdvData fields. The AdvA field shall contain the advertiser's public or random device address as indicated by TxAdd. The AdvData field may contain Advertising Data from the advertiser's Host.

[0239] The SCAN_REQ PDU has the Payload as shown in FIG. 2A. The TxAdd in the Flags field indicates whether the scanner's address in the ScanA field is public (TxAdd=0) or random (TxAdd=1). The RxAdd in the Flags field indicates whether the advertiser's address in the AdvA field is public (RxAdd=0) or random (RxAdd=1). The Payload field consists of ScanA and AdvA fields. The ScanA field shall contain